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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/882,403	06/15/2001	Mamoru Suzuki	7217/64724	8321

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COOPER & DUNHAM LLP
1185 Avenue of the Americas
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EXAMINER

TIBBITS, PIA FLORENCE

ART UNIT	PAPER NUMBER
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2838

DATE MAILED: 04/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/882,403

Applicant(s)

SUZUKI ET AL.

Examiner

Pia F Tibbits

Art Unit

2838

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☒ Other: approved amended dwgs.

DETAILED ACTION

This Office action is in answer to the amendment filed August 29, 2003. Claims 1-3 were canceled, and claims 4-6 were amended.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 4-6, as best as they can be understood at this time, are rejected under 35 U.S.C. 103(a) as being unpatentable over **Friel et al.** [hereinafter Friel][6025695].

Friel discloses a battery charging/discharging apparatus for determining a remaining capacity of a battery 28, comprising: detecting means for detecting a cell voltage/resistor R_2 in fig.2; reading means for reading a remaining capacity value based on the cell voltage detected by said detecting means/A/D converter 60; comparing means for comparing the a remaining capacity value read by said reading means with a currently stored remaining capacity value/hybrid IC 32; and updating means for updating the currently stored remaining capacity value based on a result of said comparing means//hybrid IC 32.

The patent describes a smart battery utilizing a hybrid integrated chip (IC) containing an embedded microprocessor and a novel analog to digital connector which receives analog signals from the battery and converts them to digital signals representative of battery voltage, current and temperature. The smart battery microprocessor then calculates actual charge parameters over time from these digital signals according to a predetermined algorithm in which CAP_{rem} is the remaining capacity of the battery, **which is continuously assigned a new value to reflect adjustments** for effective charge, discharge, and self-discharge (column 14, lines 55-65). Fig.3 describes the voltage levels representing battery temperature, current and voltage being applied to a switching network 55. This switching

Art Unit: 2838

network then applies these voltage levels, one at a time and in a defined sequence, to an A/D converter, and this converter converts these analog voltage levels to raw digital data values representing battery temperature, current and voltage. These raw data values are transmitted to register 61 for temporary storage and from which the data values are available to the microprocessor. The specific lengths of time that the converter processes the applied analog signals are under the control of clock signals transmitted to the converter from an internal clock 48.

With regard to the patent using battery voltage, current and temperature inputs for establishing a remaining capacity value CAP_{rem} ; eliminating battery current and temperature inputs, cited in the Friel reference, applicant neither extends the life of the batteries being charged, nor makes it easier to determine the remaining battery capacity with high accuracy, which is the object of his invention, as cited in the disclosure. Therefore it would be obvious to one skilled in the art at the time the invention was made that the elimination of an element and its function in a combination is an obvious expedient if the remaining elements perform the same functions as before. See *In Re Karlson*, 136 USPQ 184 (CCPA 1963), *In Re Wilson*, 153 USPQ 740 (CCPA 1967), and *Ex Parte Rainu*, 168 USPQ 375 (PTO Bd. of App. 1969).

With regard to the limitation of having comparing means for comparing the remaining capacity value read from said memory with the current remaining capacity value; and updating means periodically updating the remaining capacity value stored in the memory based on result of said comparing means: US 5606242 is incorporated by reference in the Friel patent, and describes including a hybrid integrated circuit (IC) having a microprocessor for receiving analog signals and converting them to digital signals representative, *inter alia*, of battery voltage, and calculating actual charge parameters **over time** from the digital signals, the calculations including one calculation for the remaining capacity CAP_{rem} of the battery according to an algorithm, and as a function of CAP_{FC} ; a reset logic, that self corrects the value of CAP_{FC} with a capacity calculation at each full charge (EOC) and each end of full discharge (EOD). The reset logic will also reset CAP_{FC} as a function of which EOD signal was acted on. Thus a new CAP_{FC} value for the smart battery's **actual capacity** is learned after each full discharge cycle, as a function of the last

Art Unit: 2838

fully integrated battery discharge cycle. The smart battery 10 of the patent is thus able to self correct CAP_{FC} within one full cycle to readjust its capacity at each EOC and EOD, and effectively relearn full battery capacity within a single cycle, even if all prior battery history has been extinguished by virtue of a catastrophic memory failure. The smart battery of the patent is therefore able to accurately predict actual capacity, and typically is able to correctly predict the remaining run time to empty within a few minutes for the battery [see also the abstract, column 1, lines 27-30, 41-50, 60-64; column 2, lines 43-54, 64-67; column 5, line 12-15; column 6, lines 7-40, 48-62; column 14, lines 28-55; column 15, lines 3-4, 14-40; column 19, lines 4-19, 40-63; etc.]. Therefore, it is an inherent function of the smart battery, disclosed by Friel, to continuously monitor the battery remaining capacity value, compare it to a battery remaining capacity value at the last fully integrated battery discharge cycle, and reset/store in a logic/memory an actual updated battery remaining capacity value, and MPEP 2100 states that the disclosure of a limitation may be expressed, implicit or **inherent**.

With respect to the method claim 6: the method steps will be met during the normal operation of the apparatus described above.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Response to Arguments

4. Examiner acknowledges receipt of amended drawings and changes to the specification.

5. Applicant's arguments filed on August 29, 2003 have been fully considered but they are not persuasive in view of the rejections described above, and the response outlined below.

Art Unit: 2838

In response to Applicant's argument stated the present invention is intended to provide a system for determining an actual remaining capacity of a battery; the problem is that although the remaining capacity value can be calculated and stored, subsequent events result in that stored value becoming incorrect, and that periodically the stored value needs to be updated, so that at all times the stored value is the actual remaining capacity value: Friel clearly states that its patent discloses a rechargeable power unit that will accurately maintain its own state of charge information even when nominally fully discharged such that a user will have instantaneous access thereof [where SOC is by definition the actual capacity expressed as a percentage of the full charge capacity (i.e., the capacity of the battery when fully charged) and is used to estimate the amount of charge remaining in the battery] [see also US 5606242]. Friel also discloses the host device 16 may communicate with the smart battery over the system management bus 14 and request information from the battery for use in the system power management scheme, thereby providing the user of the host device with information about the battery's present state and capabilities. The host device 16 will also receive notice of critical events, including alarm conditions, remaining capacity below a user set threshold value, a remaining run time below a user set threshold value, or an end of discharge signal. The alarm conditions include but are not limited to overcharging, overtemperature, a remaining charge capacity below a predetermined or user set capacity, or, a run time below a predetermined or user set run time remaining. Friel also discloses CAP_{rem} being adjusted for self-discharge, and that the CAP_{FC} is a learned value, which is self-correcting because of, reset logic incorporated in the capacity algorithm.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date

Art Unit: 2838

of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art cited in PTO-892 and not mentioned above disclose related apparatus: **Arai et al.** [5698983], **Uskali et al.** [5455499], **Kawahara et al.** [5739674], **Shimoyama** [5793211], **Marritt et al.** [5847566] all disclose a method and/or apparatus for measuring a remaining battery capacity. **JP-11223665** discloses in the abstract the charging and discharging current of battery (14) is integrated and remaining capacity of the battery is calculated; based on the opening terminal voltage of battery, remaining capacity of the battery is estimated; based on the difference between the calculated value and estimated value, **remaining capacity of battery is adjusted by an updating unit.** **JP-08278355** discloses in the abstract a release voltage detected by a voltage sensor 9 is read by means of a detection value input circuit 12 just after ignition ON, and the preset initial remaining capacity is set in a remaining capacity calculation part 23, then it is indicated by percentage. After a vehicle starts running, a computer 19 samples at 1ms the voltage and discharge, current detected by a sensor 9 and current sensor 7 so as to obtain an approximate line, and the reference discharge current is obtained at percentage as it is set to zero. The data shown by percentage is compared with the previous one, and when it is the same it is indicated as it is, while it is subtracted/added by 1% when it is more than/less than the previous one, then the result is indicated by an indication part 11.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Pia Tibbits whose telephone number is (571) 272-2086. If unavailable, contact the Supervisory Patent Examiner Mike Sherry whose telephone number is (571) 272-2084.

Art Unit: 2838

9. Any inquiry of a general nature or relating to the status of this application should be directed to the Technology Center receptionist whose telephone number is (571) 272-2800. Papers related to Technology Center 2800 applications only may be submitted to Technology Center 2800 by facsimile transmission. Any transmission not to be considered an official response must be clearly marked "DRAFT". The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Technology Center Fax Center number is (703) 872-9306.

PFT

April 27, 2004


Pia Tibbits

Patent Examiner